Remarks/Arguments

Status of Claims

Claims 1-6 and 17-25 are pending.
Claims 1-6 and 17-25 stand rejected.
Claims 1 and 17 have been amended.

Claim Amendments

Independent claims 1 and 17 have been amended solely for the purposes of clarifying the claimed invention and placing the application in an improved condition for allowance. Specifically, claims 1 and 17 have been amended to clarify that the embodiments of the present invention are directed to suppressing a dithering pattern resulting from the motion of an object on a display.

Claim Rejections – 35 U.S.C. § 103(a)

Claims 1-6, 17-23 and 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ishii et al. (U.S. Patent 6,288,698, hereinafter "Ishii") in view of Kawakami et al. (U.S. Patent 6,661,470, hereinafter "Kawakami"). Claim 24 is rejected over the above-combination, in further view of Wu et al. (U.S. Patent 6,469,708). Applicants respectfully traverse the new rejection for at least the following reasons.

Applicants agree with the Examiner that Ishii "discloses stabilizing gray-scale display of data by controlling the RGB input data via programmable parameters such as dithering pattern characteristics" concerning "a grey scale portrayal of video pictures". Action, page 3. While Applicants submit that one of ordinary skill in the art would recognize this grey shading operation (achieved by smoothing the quantization

noise) as a separate and distinct operation from the use of a dithering function to suppress a dithering pattern visible to a viewer, claim 1 has been amended to recite:

> A method for processing video data…to suppress a dithering pattern caused by the movement of an object on the display device from appearing to a viewer observing the moving object…
>
> … changing at least one of the phase, amplitude, spatial resolution and temporal resolution of said dithering function in accordance with said at least one motion vector representing the movement of a moving object on a picture when applying the dithering function to said video data in the dithering device of the video data processing device to suppress the dithering pattern caused be the movement of the object on the display device from appearing to a viewer observing the moving object on the picture…(emphasis added).

Claim 1 has been amended to more clearly distinguish between dithering patterns caused by grey scale portrayal of video pictures, and dithering patterns appearing due to a moving object on the picture. In addition to the distinct origins and characteristics of these two types of screen artifacts, the means to prevent dithering patterns appearing due to grey scale portrayal described in the prior art references of record are not able to prevent dithering patterns caused by the motion of an object. Moreover, the means to avoid dithering patterns appearing due to grey scale portrayal may in fact cause appearance of dithering patterns resulting from a moving object.

Specifically, the method of Ishii (avoiding dithering patterns appearing due to grey scale portrayal) may in fact cause dithering patterns appearing due to a moving object in, for example, cases where the method is used to optimise a maximum grey scale dithering, where alternating “I” and “0” and the inverted values for a maximum resolution and dithering are provided. In this case, it is clear that the same order of “I” and “0” is visible in the next pixel if the object moves one pixel (resulting in a visible dithering pattern). Consequently in Ishii, grey scale related dithering is not able to avoid dithering patterns occurring due to object movement.

As Ishii neither discloses nor suggests features related to suppressing dithering patterns caused by the movement of an object on the picture, claim 1 should be allowable. Independent claim 17 has been amended to recite features similar to those set forth above with respect to claim 1 and should be allowable for at least the same reasons.

Further, claim 1 requires:

> …changing at least one of the phase, amplitude, spatial resolution and temporal resolution of said dithering function in accordance with said at least one motion vector representing the movement of a moving object on a picture when applying the dithering function to said video data in the dithering device of the video data processing device…(emphasis added)

The Action cites Kawakami as disclosing this arrangement. Applicants agree with the Examiner that Kawakami discloses a moving picture display method and apparatus for effectively restraining a false contour generated when a moving picture is displayed. See col.1, ll. 5-10. However, restraining a false contour is a notably different problem than that of suppressing a dithering pattern from appearing to a viewer observing a moving object, and requires a distinct and unrelated solution to that recited in the claimed invention.

False contour is a common plasma display panel artifact, which can appear when a smooth transition is moving. In the middle of the smooth transition, a line, not present in the original video, appears and creates a false contour as illustrated in FIG. 2 of Kawakami. False contour occurs due to the use of grey scale methods which render the video levels using sub-fields. These sub-fields are temporally distributed over a frame but are spatially assigned to a pixel. This temporal distribution can interfere with the motion of the objects and create the false contour. This can be compensated by, for example, taking into account the motion of the objects and modifying the sub-field information according to this motion. In this way, Kawakami teaches: "when a moving

picture of an object whose contrast is gradually changed is displayed, the so-called false contour … is generated." Col. 1, ll. 56-60. The principles regarding generating the false contour by the sub-field halftone display are illustrated in FIGs. 2(a) and 2(b) and described in col. 2, ll. 4-34.

Applicants also agree that "Kawakami et al. discloses a motion vector detector which detects a motion vector in a block of each R, G, B color components (see column 12, lines 18-27)." However, in the preceding sentence (Action, page 4), the Examiner states that "Kawakami et al. explicitly discloses the moving picture data as video signal data as the device of the invention receives video signal data and performs processing thereupon (see column 8, lines 20-32 and Figure 3)." In response, Applicants direct the Examiner's attention to col. 18, ll. 66 - col. 19, ll. 13, in which Kawakami explicitly teaches that "the data distribute processing section 106 carries out data processing which does not depend on the motion detection" (emphasis added). For example, FIG. 23 of Kawakami illustrates that Density Gradient Detection Processing Section 104 and Data Distribute Processing Section 106 are not dependent on the Motion Detection Processing Section 105.

Kawakami applies a multi-bit error diffusion or pixel distribution method for dithering using a pseudo-halftone method. However, Kawakami fails to disclose, nor even remotely suggest influencing this halftone dithering method with a motion vector. More specifically, Kawakami teaches dithering performed independently from and parallel to the false contour correction which utilizes the motion vector. In this way, Kawakami teaches away from the present invention. Moreover, data Selector 108 illustrated in FIG. 23 of Kawakami suggests that the pseudo-halftone dithering method could actually interfere with false contour compensation, and proposes not to use the

pseudo-halftone dithering method when there is motion, which again clearly teaches away from the present invention.

Further, Applicants disagree that "Kawakami et al. explicitly discloses utilizing the motion vector data to correct at least the spatial resolution (via pixel offset correction data supplied in a table) of the pixel video image data (see columns 16-17, lines 46-13, column 18, lines 14-25 and Figures 7 -11)" (emphasis added). Nowhere does Kawakami disclose correcting at least the spatial resolution. Moreover, one of ordinary skill in the art would have no motivation to correct the spatial resolution, it would not aid in restraining a false contour. False contour is a grey level rendition problem ("visual light amount"), not a resolution problem. Cols. 16-17, ll. 46-13, col. 18, ll. 14-25 and FIGs. 7-11 cited by the Examiner disclose that 16x16 blocks are used for motion estimation to compensate the false contour.

More specifically, columns 16-17, lines 46-13 as cited by the Examiner read:

> According to the result of the above integration processing, in the VGA type having 640x480 pixels, since the detection block has 16x16 pixels, the total number of detection blocks is 1200. The averaged error obtained by this integration processing is improved about 20% as compared with the system previously mentioned, extreme variations in the motion vector are not shown, and there can be obtained the result in which the entire motion vector can be correctly reflected. Thus, the respective numbers of the motion pixels obtained for the R, G and B images are integrated into one value for each block, and registered into the motion vector table as the number of motion pixels. Next, the following will explain the processing content of the correction processing block 4. The configuration of the data correction processing section 4 is shown in FIG. 7. Motion vector information of each detection block KB of the present field is registered in the motion vector table 29. The structure of the motion vector table 29 is shown in FIG. 8. FIG. 8 presents an example of the motion vector table in the case of the VGA type, which can display the image having 640 pixels in the horizontal direction and 480 pixels in the vertical direction. In this case, if the detection block has 16 pixels in the horizontal direction and 16 pixels in the vertical direction, the total number of blocks is 1200, and the number of motion pixels and the direction of each block are registered in table with respect to each block. Here, the upper left portion of each block is set as an origin of coordinates. The block number of the detection block KB, an offset value from the origin of

> the detection block KB, and the number of motion pixels (including the moved direction) from the previous field of the detection block KB are registered in order of the detection block in which the motion detection of the present field image has been finished.

While column 18, lines 14-25 cited by the Examiner read:

> Correction data specified by the false contour generation level, which is output from the false contour generation pixel candidate detector 52, and the number of motion pixels in the x and y directions, which is extracted from the motion vector table 29, is extracted from the correction table 53, and provided to a correction calculating section 54. In correcting original image data, since correction data for the pixel having the false contour generation level and a motion is provided from the correction table 53 corresponding to the number of pixels and the moved direction thereof, the correction calculating section 54 corrects the signal level to adjust to the visual light amount.

None of these citations teach or suggest correcting at least the spatial resolution of the pixel video image data as set forth by the Examiner.

Further, Kawakami reads in col. 4, ll. 20 - 26:

> Also, the present invention provides the moving picture display method in which a pixel density of a target pixel is distributed to an image region influenced by the target pixel moved for a subfield period, and the presence or absence of light-emission of the sub field in the respective pixels whose density is distributed from peripheral pixels is determined in accordance with the total sum of pixel density.

The total sum of pixel density is a reason that dithering patterns hidden in a still picture become visible in case of a moving object, as has been discovered and solved by the present invention.

Once again, Applicants kindly draw the Examiner's attention to MPEP 2142 which states that the Examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. The Supreme Court has stated that "[t]he key to supporting any rejection under 35 U.S.C. § 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. *KSR Intl Co. v. Teleflex Inc.,* 82 USPQ2d 1385, 1396 (2007) (KSR). The Federal Circuit has

reiterated that "rejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn,* 441 F.3d 977, 988 (Fed. Cir. 2006).

The Action articulates no reasoning or explanation of how the motion vector used to suppress a false contour as disclosed in Kawakami would be implemented into a system configured to suppress a dithering pattern caused an object in motion. As noted above, dithering in Kawakami is performed independently from the disclosed false contour correction utilizing the motion vector. Moreover, Ishii makes no teaching, or even remotely suggests using a vector of any kind for altering a dithering function, let alone a vector representative of the motion of an object contained in the input video data. Accordingly, Applicants respectfully submit that merely stating that a motion vector could be used to alter the dithering function disclosed in Ishii comprises nothing more than an unsupported, conclusory statement of obviousness.

For at least these reasons, Applicants respectfully request the withdrawal of the 35 U.S.C. § 103(a) rejection of claims 1 and 17. Claims 2-6 should be patentable at least by virtue of their ultimate dependence from claim 1. Likewise, claims 18-25 should be patentable at least by virtue of their ultimate dependence from claim 17.

While Applicants submit the above-remarks sufficiently set forth clear grounds for the removal of the present rejections, Applicants maintain their previous position that Ishii, more generally, neither discloses nor remotely suggests anything related to moving objects on a display, nor to any video data processing device capable of suppressing a dithering pattern from appearing to a viewer observing these moving objects.

Specifically, the Action cites Ishii as disclosing that reduced grey scaling, as performed by the invention, effectively smoothens gray-shade display and RGB distributed dithering (see column 2, lines 59-67). Therefore, the Examiner's position is that the techniques utilized in Ishii can be interpreted as "suppressing" dithering artifacts, as "smoothing" of dithered data is explicitly performed which can, at least inherently, be seen as smoothing artifacts within the dithered data. However, this statement is only accurate if it is related to image data of a still picture, as it is a matter of fact that the temporal averages of the same frames are different for a stationary object compared to a moving object on the display, as the eyes of a viewer observing said moving object follow said movement. See, for example, paragraph [0020] of Applicants' specification as published.

According to Ishii: "Subject invention arises in electronic apparatus and signal processing method for gray scale and brightness display control" Col. 1, ll. 34-36. This grey scale and brightness display control is achieved by a Frame Rate Control "FRC algorithm with RGB phase number control (which) reduces screen flicker and stabilizes 256-gray scaling." Col. 2, ll. 59-61. A "well-balanced RGB phase number distribution is achieved among frames to provide smooth display in 256 gray-scale." Col. 6, ll. 60-62. Consequently, Ishii teaches an improved dithering by an "even distribution of phase number may be used at spatial and/or temporal adjacent pixels to avoid undesirable visual disturbances, such as flickering, streaming, and screen beating." Col. 6, ll. 49-53. However, Ishii neither discloses nor suggests anything related to a moving object on a picture when applying the dithering function to said video data to suppress a dithering pattern from appearing to a viewer observing the moving object, as Ishii is only related to grey scale and brightness display control.

The Examiner states at page 2, last paragraph:

> In reference to claim 1, Ishii et al. discloses a method for processing video data in a video data processing device for display on a display device having a plurality of luminous elements to suppress a dithering pattern from appearing to a viewer observing a moving object on the display device, the moving object represented by said video data (see column 1, lines 35-53, column 2, lines 35-38, 46-55 and Figure 1A wherein Ishii et al. discloses … (emphasis added).

However, none of the citations provided by the Examiner make any reference to a dithering pattern resulting from a moving object, nor even mention a moving object being observed by a viewer. Thus, contrary to the Examiner's assertion, Ishii cannot teach or suggest the following limitations of claim 1:

> …to suppress a dithering pattern…from appearing to a viewer observing the moving object, the moving object represented by said video data…(emphasis added)

nor

> …outputting the dithered video data from the video data processing device to the display device to suppress the dithering pattern from appearing to a viewer observing the moving object on the picture on the display device (emphasis added).

For at least these additional reasons, Applicants respectfully request the withdrawal of the 35 U.S.C. § 103(a) rejection of claims 1 and 17. Claims 2-6 should be patentable at least by virtue of their ultimate dependence from claim 1. Likewise, claims 18-25 should be patentable at least by virtue of their ultimate dependence from claim 17.

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been

expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Conclusion

Having fully addressed the Examiner's rejections it is believed that, in view of the preceding amendments and remarks/arguments, this application stands in condition for allowance. Accordingly, reconsideration and allowance are respectfully solicited. If, however, the Examiner is of the opinion that such action cannot be taken, the Examiner is invited to contact the applicants' attorney at (215) 542-5824, so that a mutually convenient date and time for a telephonic interview may be scheduled.

Respectfully submitted,

/Edward J. Howard/
Edward J. Howard
Registration No. 42,670

Date: January 18, 2011

Patent Operations
Thomson Licensing LLC
P.O. Box 5312
Princeton, New Jersey 08543-5312